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ABSTRACT

"Stimulated recall" is a generic term used to identify a variety of interviewing techniques designed to provide access to teachers' thoughts during interactive teaching. The methods usually involve audio or videotape recordings of classroom activities, whereby teachers are to "recall" what they were thinking at the actual time of the taping by means of the cues or stimuli provided in the tape. A critical review of the uses of these methodologies by researchers was undertaken. It is concluded that the verbal reports received through stimulated recall are of questionable validity when identified as interactive thoughts or decision-making. The interests of research may be better served if these data are considered retrospective reports of teachers' professional craft knowledge. It also seems that verbal reports of reflection on knowing-in-action might be encouraged through unstructured interviews during the viewing of the videotape, rather than through the use of a schedule of questions. Related to this, the verbal directions given by the researcher prior to viewing ought to be general. Finally, two analytic techniques are suggested that provide the researcher with means of approaching verbal report data that are consonant with the view of the data as professional craft knowledge (i.e., teacher coding of the data into categories selected and named by the teacher, and analysis of the metaphoric language used during the interview). (TJH)

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STIMULATED RECALL AND TEACHERS' THOUGHT PROCESSES: A CRITICAL REVIEW OF THE METHODOLOGY AND AN ALTERNATIVE PERSPECTIVE

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Stimulated Recall and Teachers' Thought Processes:
A Critical Review of the Methodology and an Alternative Perspective

"Stimulated recall" is a generic term used to identify a variety of interviewing techniques designed to provide access to teachers' thoughts during interactive teaching. Typically, the process involves mechanically recording (either audio or videotaping) actual classroom activities in situ, although at least one research study used an experimental setting (Peterson and Clark, 1978). Teachers are then asked to view (or listen to) these recordings and to describe their thought processes at certain points during the class. That is, teachers are to "recall" what they were thinking at the actual time of the taping by means of the cues or stimuli provided in the tape.

Although the above provides a general description of stimulated recall techniques, individual researchers have designed a wide variety of specific applications of this approach. Table 1 demonstrates the diversity found in a group of selected studies, each of which used some form or another of "stimulated recall." It should be noted that, in addition to the descriptors heading the columns, these studies also vary in the number and type of respondents participating in the study e.g. 10 student teachers (Galuzzo, 1984), 8 experienced teachers (Nespor, 1985), or 8 of both (Housner and Griffey, 1985), and in the manner of selecting such respondents e.g. "random selection" (Parker and Gehrke, 1986), volunteers (Mackay and Marland, 1978), all those student teaching during a given period (Calderhead, 1987). In addition, the manner of analysis of the interview data varies from study to study from those using coding

TABLE 1.

Specific Applications of "Stimulated Recall" In Selected Research (1)

Study	Audio or Video?	Viewed Before Interview?	Probes	Fragments/ Entire	How Tape Stopped	Area of Interest
Peterson & Clark (1978)	Video (lab)	Yes, Interviewer	Yes	Fragments	At end of fragments	Teachers Interactive Decisions
Mackay & Marland, 1978	Video	Yes, Interviewer	Yes	Fragments	Teacher	Thought Processes
McNair 1978/79	Video	No	Yes	Entire (Two times)	Teacher & Researcher	Inflight Decisions
Haigh 1982	Audio	No	Dialog	Entire	Teacher	Clearly Registered Thoughts
Nespor 1985	Video	No	Yes	Entire	Teacher & Researcher	Beliefs
Fogarty, Wang, Creek 1983	Video	Yes, Interviewer	Yes	Entire	Teacher & Researcher	Goals & Prior Knowledge at Decision Pts
Galluzzo 1984	Video	No	Yes	Entire	Teacher & Researcher	Thoughts, Concerns
Housner, Griffey 1985	Video (lab)	Yes, Interviewer selected	Yes	Fragments	Not stopped until 4 min. segments	Decision Making Process
Parker, Gehrke 1986	Audio	No	First two times tape was stopped	Entire	Teacher	Interactive Decisions
Dalton, Dodd 1986	Video	No	Yes	Entire	Teacher, Reseacher	Thoughts Conscious Decisions
Keith 1987	Video	No	Unstructured	Entire	Teacher	Practical Knowledge
Calderhead, Miller 1987	Video	No	Unstructured	Entire	Teacher	Subject Matter Knowledge

(1). See also Clark and Peterson (1986) for an additional listing.

systems developed in earlier studies, to those developing categories and coding systems from the study, to those developing a unique analytic scheme and examining the language of the respondents, the sequence of thoughts during the interview, or alternatives to researcher coding (See Morine-Dershimer, 1983; Keith, 1987)

Several observations may be made concerning Table 1:

1. researchers ought not talk about the stimulated recall methodology, but rather a stimulated recall methodology;
2. researchers have not yet determined a single best way to carry out stimulated recall interviews, thus requiring that readers of such research carefully examine each specific application - how the method was applied may influence the conclusions drawn;
3. researchers use a variant of the same methodology to explore a wide range of topics all subsumed under teachers' interactive thought processes.

An exploration of issues relating to these three observations will be provided in the remainder of this paper. First, a brief overview of the development of stimulated recall as a research strategy and the assumptions behind it will be provided. Then a set of criticisms directed to these assumptions will be set forth. Finally, a recommendation of those occasions when stimulated recall might be the method of choice, and a data analysis process consonant with its use in those cases will be described.

Development and Assumptions

According to Yinger (1986), "nearly every study using stimulated recall references Benjamin Bloom's studies of students' thought processes as the foundational work" (1986, p. 8). The purpose of

Bloom's study was to examine college students' conscious thoughts during different forms of instruction (Bloom, 1953). His method of investigation involved making sound recordings during the entire class period which were then played back to the students within two days. Bloom writes "as the recording was played back to them (the students), at a number of selected critical points, they were asked to tell the thoughts they had experienced during the original situation. They were also invited to volunteer reports of thoughts they had at other times they believed to be important or relevant" (1953, p.165). These reports were then categorized according to their content and relevance to the subject matter under discussion in the taped classrooms, and comparisons were made between the different forms of instruction (lecture or discussion).

Kagan, Krathwohl, and Miller (1963) later used a form of stimulated recall using videotape, which they called Interpersonal Process Recall (IPR), in order to increase counsellors' awareness of interpersonal interactions during counselling. Elstein, Kagan, Shulman, Jason, and Loupe (1972) also used stimulated recall interviews in research on the thought processes of physicians during a simulation of clinical decision-making. Yinger (1986) reports that the first use of stimulated recall as a method to study interactive teaching was in a study at the Stanford Center for Research and Development in Teaching in 1974 (see Peterson and Clark, 1978), and that its use was suggested by Lee Shulman, "who was currently using this method as part of a study of physician diagnosis with his colleagues at Michigan State University" (p. 7). Two of those "colleagues" were Kagan and Elstein, early developers of the

process. Since the seminal work done at Stanford, the use of stimulated recall as a method of data collection on teachers' interactive thoughts has rapidly increased. There are now at least two dozen of them which have been reported, some of which are presented in Table 1. (Also see Yinger, 1986, p. 9).

It appears that researchers, for the most part, have accepted the the assumptions and rationale provided by Bloom for his original study (1953). He writes that his "basic idea underlying the method of stimulated recall is that a subject may be enabled to relive an original situation with vividness and accuracy if he is presented with a large number of the cues or stimuli which occurred during the original situation (1953, p. 161). He goes on to write:

> If we make the major assumption that the cues enable a person to recall thoughts, we have one means by which to infer the accuracy of the recall. Thus we have made a number of studies in which the recording is played back to students, and they are asked to tell what overt events follow immediately after that particular point in the recording. We have found as high as 95 per cent accurate recall of such overt, checkable events within two days... The inference that the recall of one's own private, conscious thoughts approximates the recall of the overt, observable events has led to the anticipation that the accuracy of the recall of conscious thoughts is high enough for most studies of learning situations - if the interviews are made within a short time after the event" (1953, p. 162).

Bloom notes that these inferences are about the recall of mental events, not the reporting of those things recalled. He writes:

> The extent to which a student will report the most private of his thoughts is largely a function of the rapport which is established in the interview situation. Also students do not report all their thoughts; frequently they select and report the thoughts they believe to be most relevant, or they characterize their thoughts rather than report them as they occurred. (1953, p.162)

One of the more apparent problems with transferring Bloom's rationale without question onto the use of stimulated recall in studies of teacher's thinking is that the respondents in his study (the students) were observers during the lessons, while in studies of teacher thinking, the respondents (the teachers) are actors during the lessons. This clearly seems to present a different case. Several researchers (Calderhead, 1981; Nespor, 1985; Yinger, 1986) have expressed additional concerns about the validity of the data reported during stimulated recall interviews, and challenge Bloom's major assumption that such data provides information about a person's (teacher's, in this case) moment-to-moment thought processes and decision-making during actual instruction. The question concerning validity thus is: what is "measured" by stimulated recall techniques - what is the data that is collected, data on? There are three sets of issues to be explored in order to identify one possible answer to this question: 1) "bias in questioning" (Nespor, 1985, p.218); 2) nature of the stimulus (the audio or videotape); 3) availability of interactive thoughts for recall.

Bias In Questioning:

Nespor (1985) writes "there are a number of problems and ambiguities arising from the kinds of questioning strategies used in stimulated recall interviews" (p.218). The problem of respondents identifying the aims of the researcher and complying with them has long been discussed in the area of interview and questionnaire methodology (e.g., Oppenheim, 1966; Cicourel, 1964). Galuzzo's 1984 study, cited in Table 1, for example, used stimulated recall as a means of investigating whether student teachers' interactive thoughts and decisions evidenced the same concerns as experienced teachers, identified in an earlier study. Each time the tape was stopped he asked the following questions: 1) What were you thinking at this point? 2) What did you notice that made you stop and think? (Probe: Was there anything the pupils were doing that made you stop and think?) 3) What did you decide to do? 4) Was there anything else you thought of doing at that point, but decided against? 5) What was it? (Galluzzo, 1984, p. 9). It is possible, in fact probable (as verbal reports seem to be easily influenced), that his respondents were influenced by the focus of his questions on student-teacher interactions, and that the researcher's pre-existing category system and his point of view biased the content of the interviews. (See Munby, 1982, p. 210-213).

Nespor (1984) further suggests that bias can exist because of the nature of the directions given to the teachers prior to the interview:

> One may ask teachers to stop the tape and comment when they see themselves making 'decisions' but, aside from the problem of

whether they could possibly have this introspective knowledge, there is no assurance that they define or understand 'decision' in the same way as the researcher or that decisions will manifest themselves in an unambiguous fashion in teachers' verbal reports (cf. Mackay & Marland, 1978, pp. 10-11)" (p. 219).

It seems that one way to vitiate the problem of bias in the questioning would be to not have any schedule of questions, that is, to hold unstructured interviews. In addition, it would seem helpful to derive the categories after interviews rather than prior to them, and to make directions open-ended e.g., "stop the tape when you want to talk about what you see," or as suggested by Calderhead (1981) "tell me about what is going through your mind" (p. 215). As Shavelson, Webb, and Burstein (1986) state, "The extent to which the limited amount of information on thought processes is retrieved undistorted depends on the nature of the probes used by the researcher" (p.83).

Nature of the Stimulus

It seems that one would be hard pressed to argue that an audio tape of a classroom interaction presents the same stimulus environment as when the interaction was happening (or "live"). If teachers take cues from observing the students in their classrooms, and this seems likely, then the lack of these cues would make remembering interactive thoughts difficult, not to mention other aspects of the classroom environment that would be unavailable to cue recall. At the risk of dismissing such studies out of hand, this section will concentrate on the use of videotape as the stimulus in stimulated recall interviews.

The issues related to the nature of the videotape record of a teaching occasion concern how closely the cues (stimuli) presented through the tape match those provided by the orignal interaction. Is the viewer reliving the original event or is a new event created at the time of the viewing and interview? (See Yinger 1986, p. 14-18 for a more complete discussion of this.) Therefore, is recall actually being stimulated or is the viewer constructing responses to new and different cues that were not seen during the interaction, but are present during the stimulated recall viewing/interview? Some reasons which support the argument that a different stimulus environment has been created are; the "unaccustomed perspective (as detached viewers looking at a video screen)" (Nespor, 1985, p.215), teachers' tendency to focus on themselves while viewing the lesson, the stress associated with viewing a videotape of one's own lesson (Fuller and Manning, 1973), and the presence of the interviewer, and the questions themselves as posed by the interviewer. Finally, related to the nature of the stimulus cues, if teachers view themselves (as observers) during the replay of the videotape, there would be a tendency to overestimate dispositional causal explanations for what they saw, while during the original lesson they viewed the interaction as <u>actors</u> and therefore had a tendency to overestimate <u>situational</u> causal explanations (Sears,1985).

Nespor (1985) takes great care is describing the placement of the camera, who should run the camera, upon what activities the camera should be focused, and whether the camera should be moved during the course of the interaction being taped (p. 200-205). However, even if the camera does not always focus on the teacher and even if attempts

are made to reduce the stress and anxiety of the teacher (e.g., Tuckwell, 1980), the above seem to provide sufficient reason to question whether the nature of the stimulus occasion (viewing the videotape) presents the teacher with "a large number of the cues or stimuli which occurred during the original situation" (Bloom, 1953, p. 161).

Availability of Interactive Thoughts For Recall

It is not within the realm of this paper to explore all the theoretical issues surrounding human cognition. Rather, several aspects of current thinking about these issues will be provided which are sufficiently compelling so that researchers must question if the verbal data provided during stimulated recall interviews are descriptions of interactive thoughts, or something else.

There is evidence that aspects of teacher behavior become an automatic part of their classroom activity - those things which have been compiled into routines and patterns of behavior (Leinhardt, 1983). Such automatized processing is not available for verbal reports because teachers are not consciously aware of them. (See Calderhead, 1981; Shavelson, Webb & Burstein, 1986). It may well be impossible for teachers to describe their highly automated interactive decisions and the cues used to make them, even if they wanted to do so.

Nisbett and Wilson (1977) aver that self-reporting of higher-order cognitive processes (of which decision-making is one) is impossible and that self-report data is the result of causal theory building, which may or may not represent the actual thinking processes involved. Further, neither the respondent nor the

researcher have any way of knowing if the reported verbal data on thinking is or is not isomorphic to the actual processes. On the other hand, Ericsson and Simon (1980, 1984) have developed a model of those conditions under which verbal reports may be considered valid - that is, represent the thinking processes of the respondent. Unfortunately, they have not included stimulated recall in their considerations, but Yinger (1986) has suggested that stimulated recall would belong in their category of "Concurrent Probing" (p.15). He continues:

> What is important to note, however, is that what is being probed here is the contents of STM (short term memory) related to the videotape stimulus along with non-specific LTM (long term memory) information related to E1 (the original event), E2, and E3 (information stored in LTM related to other similar events). In other words, stimulated recall primarily produces a record of a subject's reasoning about the videotape stimulus and only secondarily about thinking related to the original event. ...the direct and strongest associative links to LTM are for E4 (the videotape stimulus). Memory of E1 is confounded with links to E2, E3, and E4 (p. 15).

Again, in Yinger's explanation, stimulated recall interviews may actually stimulate recall; it is just not possible to know when this is taking place.

How, then, might the verbal reports generated during stimulated recall interviews be understood? Of what are they valid reports?

Verbal Reports As Professional Craft Knowledge

Professional craft knowledge has been defined as "that part of teachers' professional knowledge which is acquired primarily through their practical experience, is brought to bear spontaneously and routinely on their teaching, and so guides their day-to-day actions in classrooms" (Brown, 1988, p.1). Part of this craft knowledge may be described as procedural information (as opposed to declarative knowledge) or a series of if/then statements - implicit "theories" that teachers build through the experience of teaching. A second aspect of craft knowledge is that it consists, in part, of a set of strategies or techniques that have been proven to be effective in the particular situation of teaching (e.g. Shulman's "maxims", 1986, p. 11). A final component of professional craft knowledge has been variously named "beliefs" (Nespor, 1985) or "images" (Schon, 1983; Elbaz, 1983; Keith, 1987) or "general perceptions" (Calderhead, 1985). According to Elbaz (1983):

> "Images serve to guide the teacher's thinking and to organize knowledge in the relevant area. The image is generally imbued with a judgement of value and constitutes a guide to the intuitive realization of the teacher's purposes" (p.61).

Nespor (1985) similarly defines beliefs as serving to frame the classroom context in order to help teachers define tasks in a complex environment. That is, images serve to enable teachers to conceptualize their role and actions or to organize what they perceive and give it meaning in order to bring about their purposes.

If it is likely that the verbal data elicited by means of stimulated recall interviews are not, in fact, recalls of teacher thinking at the time of the taping, but rather something else, it

seems reasonable to think that the "something else" are examples of a teacher's professional craft knowledge.

Nespor (1985), after an examination of the use of stimulated recall techniques for his study on teacher beliefs, states,

> "Stimulated recall interviews are undoubtedly valuable sources of information on the ways teachers explain and justify their practices - that is, they are valuable tools for gaining insight into teachers' beliefs about teaching" (p. 221).

It has also been suggested that the retrospective reports provided by stimulated recall interviews are a teacher's attempts to make sense of the action viewed on the videotape. Stimulated recall is, therefore, a means to elicit reflection on knowing-in-action (Schon, 1983), providing "access to the ways in which teachers make sense of teaching episodes" (Yinger,1986, p. 22-23). In addition, Yinger agrees with Nespor that stimulated recall may "elicit teachers' implicit theories and beliefs as well as their understandings of the specific patterns of behavior or interaction" (p. 23).

Calderhead (1985) also suggests that stimulated recall may be useful for "eliciting teachers' general perceptions of events, general goals related to these events, and the rules or reasons for (teachers) acting as they do" (p.9). In other words, he, together with Nespor and Yinger, is suggesting that the verbal data collected through stimulated recall interviews be considered elicitations of teachers' professional craft knowledge; implicit theories or expectations, strategies, and images or beliefs. Stimulated recall would more appropriately be called "stimulated elicitation".

Some Thoughts on Analysis and Conclusions

Data from stimulated recall interviews is typically broken down into some sort of unit and then placed in categories identified by the researcher either prior to the research (as in Galuzzo, 1984) or after the research (as in Calderhead & Miller, 1987). The identification of themes in the data is similar in that themes also serve as categories. It was mentioned above, when considering issues of bias, that preconceived categories may serve to direct the researcher towards looking for that kind of data during the interview. The formulation of categories or themes post hoc, although avoiding this bias, assumes that the researcher is able to bring the same meaning to the verbal data as the teacher, and could involve problems with reliability, even if it were the same researcher doing all the coding. One solution to this problem is to bring back the coding to the teacher. Another solution, which seems wonderfully simple, is to have the teacher group the verbal data and identify the categories him/herself (Keith, 1987). This also supplies the researcher with some notions about how the teacher conceptualizes the classroom context.

Another alternate analysis procedure is to examine the transcript for examples of metaphoric language, e.g. the lesson ran smoothly, or the students seemed to get off track. Clandinin & Connelly (1984), Morine-Dershimer (1983) and Keith (1987) have used this method of analysis to provide information on the "image" held by the classroom teacher, one of the above mentioned components of professional craft knowledge.

In conclusion, it seems more precise to call stimulated recall interviews, "stimulated elictation". The verbal reports received through this method are of questionable validity when identified as interactive thoughts or decision-making. The interests of research may be better served if these data were considered retrospective reports of teachers' professional craft knowledge. It also seems that verbal reports of reflection on knowing-in-action might be encouraged through unstructured interviews during the viewing of the videotape, rather than using a schedule of questions. Related to this, the verbal directions given by the researcher prior to viewing ought to be general. Finally, two analytic techniques are suggested which provide the researcher with ways to approach verbal report data which are consonant with the view of the data as professional craft knowledge: teacher coding of the data into categories selected by the teacher and named by the teacher, and analysis of the metaphoric language used during the interview.

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